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Retrospective chart review of perioperative pain management of patients having surgery for closed ankle fractures using peripheral nerve blocks at a level one trauma center

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Abstract

Introduction: Chronic opioid use is unfortunately perceived among these postoperative patients, specifically within orthopedic surgery. Patients having orthopedic surgeries are at risk for becoming addicted to opioids, and one benefit of peripheral nerves blocks could be to provide an alternative mode of pain control. This study takes a retrospective look at the use of peripheral nerve blocks for pain control following surgery for isolated traumatic ankle injuries. We hypothesize that when peripheral nerve blocks are administered preoperatively to patients with closed ankle fractures, they will have overall better control of postoperative pain compared to patients who did not receive a peripheral nerve block.
Objectives: The objective of this investigation was to evaluate the effect of preoperative peripheral nerve blockade on pain outcomes after ankle fracture surgery.
Methods: After approval from our institutional review board, a Current Procedural Terminology code search was performed of all patients within our institution over a 3-year data collection period (August 2016–June 2019). This resulted in 177 subjects who underwent isolated closed ankle fracture open reduction internal fixation (ORIF), of which 71 subjects met inclusion criteria.
Results: Results of the primary outcome measures found no difference in the mean postoperative care unit (PACU) pain scores between the groups (2.39 ± 2.91 vs 3.52 ± 3.09; $P = 0.1724$) nor the frequency of those who reported only mild pain (63.0% vs 47.10%; $P = 0.2704$). Subjects who received a peripheral nerve block spent more time in the PACU before discharge (2.06 ± 1.05 vs 0.94 ± 1.21 hours; $P = 0.0004$). Subjects receiving a peripheral nerve block were more likely to be given no analgesics in the PACU (38.9% vs 11.8%; $P = 0.042$) and less likely to receive a narcotic analgesic in the PACU (53.7% vs 82.4%; $P = 0.047$).
Conclusion: Although the results of this investigation demonstrate no significant difference in the mean PACU pain scores, they do demonstrate a significant difference in the amount of pain medication given in the PACU setting. This information will be used for future investigations of this discrepancy between pain perception and need for immediate postoperative pain medications as it relates to multimodal pain control in the setting of ankle fracture surgery.

Keywords: Ankle fracture, Open reduction internal fixation, Postoperative pain management, Opioids, Peripheral nerve block

1. Introduction

Opioids are commonly prescribed to reduce postoperative pain.[6,27] A substantial number of postsurgical patients subsequently become addicted to prescription narcotics, with approximately 2 million people in the United States addicted to prescription opioids and approximately 530 deaths occurring weekly because of opioid overdose.[8,11,17,20] Among prescribers, orthopedic surgeons ranked the third highest in writing for opioids in 2009 after primary care physicians and internists.[3,14,16,18,22,23,29]

Closed ankle fractures are a common orthopedic problem that can present either in the emergency department setting or outpatient clinic.[15] Many patients with displaced ankle fractures will require surgical open reduction internal fixation (ORIF), and typically, patients will be prescribed narcotics postoperatively for pain control.[4,15] Publications have discussed "over prescription of narcotics" when it comes to lower extremity surgery such as ORIF.[7,9,10,13,17] Saini et al.[24] specifically looked at foot and ankle

orthopedic surgery and concluded that anesthesia type, patient age less than 60, preoperative visual analog scale score of greater than 6, and osseous-based procedures were independent factors associated with opioid consumption.

With the existing risk to patients of continued opioid use beyond the postoperative period, alternative methods of pain control must be used. Peripheral nerve blocks offer one option to provide good pain relief and decrease the number of narcotics used in the postoperative setting for patients undergoing osseous orthopedic procedures, and specifically foot and ankle surgery.[2,12,14,21,25] Patients having orthopedic surgeries are at risk for becoming addicted to opioids, and one benefit of peripheral nerve blocks might be to provide an alternative mode of pain control.

Given these considerations, the objective of this investigation was to evaluate the effect of preoperative peripheral nerve blockade on pain outcomes after ankle fracture surgery. We hypothesize that patients with administration of peripheral nerve blocks will have decreased postoperative pain scores as compared to those without peripheral nerve blocks in the setting of closed ankle ORIF.

2. Methods

After approval from our institutional review board, a *Current Procedural Terminology (CPT)* code search was performed of all patients within our institution over a 3-year data collection period (August 2016–June 2019).[5] The specific codes used in this search were as follows: 27766 (open treatment of medial malleolus fracture, includes internal fixation), 27769 (open treatment of posterior malleolar fracture, includes internal fixation), 27792 (open treatment of distal fibula fracture [lateral malleolus], includes internal fixation), 27814 (open treatment of bimalleolar ankle fracture [ie, lateral and medial malleolar, lateral and posterior malleoli, or medial and posterior malleoli], includes internal fixation), 27822 (open treatment of trimalleolar ankle fracture, includes internal fixation when performed, medial and/or lateral; with fixation of posterior lip), and 27823 (open treatment of trimalleolar ankle fracture, includes internal fixation when performed, medial and/or lateral malleolus, with fixation of posterior lip) (**Table 1**).[26]

The electronic medical records were then retrospectively interrogated for study selection criteria. Inclusion criteria were as follows: patients between the ages of 18 to 65 years, with a CPT code of 27766, 2269, 27792, 27814, 27822, and/or 27823, and with the procedure performed by an orthopedic or podiatric surgeon. Exclusion criteria included open fractures, polytrauma, pilon/crush type injuries, and/or surgery occurring greater than one month from the initial injury. Patients who did not have a postoperative care unit (PACU) pain score recorded or proper documentation of postoperative medications were labeled as incomplete medical records and therefore, met exclusion criteria. Preoperative radiographs were reviewed by one study author (S.M.) and classified according to the Lauge-Hansen classification.[30] Administration of a peripheral nerve block (defined by a combination of a femoral [popliteal block] and in most cases, an adductor canal [saphenous nerve] block) to the affected lower extremity was dependent on individual surgeon's preference at the time of surgery.

The primary outcome measure of this study was comparison of the mean PACU pain score based on the visual analog scale between those subjects who received a peripheral nerve block and those who did not. Secondary outcome measures included the average time in PACU before discharge (accounted for in the number of hours) and any analgesic medications given in the PACU. Collected demographic variables included participant age, sex, body mass index, history of smoking, drug use (defined as oral/nasal/intravenous use of schedule I or schedule II drugs based on electronic medical record documentation), alcohol abuse (defined as excessive intake of alcoholic products), type of medications administered during the peripheral nerve block (those who received dexamethasone and those who did not), and timing of the peripheral nerve blockade.

The peripheral nerve block was performed by the acute pain team, consisting of one anesthesiology attending and one anesthesiology resident using guidelines from the New York School of Regional Anesthesia popliteal and adductor canal techniques.[1,28] Initially, patients were placed in a supine position on their hospital stretcher and blankets placed under the patient's ankle and leg to maintain hip flexion. A linear ultrasound probe was placed superior to the popliteal fossa of the posterior knee joint until the sciatic nerve was visualized. Under ultrasound guidance, an insulated 4″ stimulating needle was advanced in-plane medially through the lateral thigh towards the sciatic nerve. Small aliquots of the local anesthetic mixture were injected surrounding the sciatic nerve. After this, the adductor canal block was performed by externally rotating the affected extremity and placing a linear ultrasound probe on the patient's anteromedial thigh, superior to the knee joint. Once the saphenous nerve and femoral artery were located deep to the sartorius muscle, an insulated 4″ stimulating needle was advanced in-plane under ultrasound guidance to the region of the saphenous nerve. Small aliquots of the local anesthetic mixture were injected surrounding the saphenous nerve.

Data were stored in a password-protected and encrypted personal computer for subsequent statistical analysis. All statistical analyses were performed by one study author (A.J.M.) using Statistical Analysis Systems software (SPSS), version 9.2 (SAS Institute, Cary, NC). Categorical variables were considered in terms of a frequency count and compared with use of the Fisher exact test. Continuous variables were considered in terms of the mean, SD, and range and compared with the use of the unpaired Student t test.

3. Results

The initial CPT procedural code search identified 177 potential study subjects. Of these, 13 (7.3%) were excluded secondary to open ankle fractures, 6 (3.4%) were excluded secondary to polytrauma, 8 (4.5%) were excluded because of not undergoing ORIF surgery, 12 (6.8%) were excluded because of having ankle ORIF surgery greater than one month after the initial injury, and 67 (37.9%) were excluded secondary to incomplete medical records. This resulted in 71 subjects meeting selection criteria. Of these 71, 54 (76%) underwent a preoperative peripheral nerve block as previously defined.

A comparison of subject demographics is displayed in **Table 2**. No differences between groups were observed when considering subject sex ($P = 1.00$), age ($P = 0.0795$), body mass index ($P = 0.3140$), smoking history 33 ($P = 1.00$), alcohol abuse history ($P = 0.5871$), drug abuse history ($P = 0.3885$), or fracture classification ($P = 0.73$–1.00).

A comparison of immediate postoperative pain outcomes is presented in **Table 3**. No differences were observed with respect to the mean PACU pain score among subjects with a peripheral nerve block compared with those without a peripheral nerve block (2.39 ± 2.91 vs 3.52 ± 3.09; $P = 0.1724$), nor was there a difference in the number of those who only reported mild pain (63.0% vs 47.10%; $P = 0.2704$). Subjects who received a peripheral nerve block were found to spend more time in the PACU before discharge (2.06 ± 1.05 vs 0.94 ± 1.21). Finally, as demonstrated in **Table 4**, subjects receiving a peripheral nerve block were more likely to be given no analgesics in the PACU (38.9% vs 11.8%; $P = 0.042$) and less likely to receive a narcotic analgesic in the PACU (53.7% vs 82.4%; $P = 0.047$).

Table 1

Common Procedural Terminology (CPT) codes used for initial search criteria from August 2016 to June 2019.

CPT code	Description
27766	Open treatment of medial malleolus fracture, includes internal fixation
27769	Open treatment of posterior malleolar fracture, includes internal fixation
27792	Open treatment of distal fibula fracture (lateral malleolus), includes internal fixation
27814	Open treatment of bimalleolar ankle fracture (ie, lateral and medial malleolar, lateral and posterior malleoli, or medial and posterior malleoli), includes internal fixation
27822	Open treatment of trimalleolar ankle fracture, includes internal fixation when performed, medial and/or lateral; with fixation of posterior lip
27823	Open treatment of trimalleolar ankle fracture, includes internal fixation when performed, medial and/or lateral malleolus, with fixation of posterior lip

Table 5 displays within-group comparisons of subjects receiving a peripheral nerve block. No difference in the mean PACU pain scores was observed when comparing unimalleolar fractures with a single incision to bimalleolar fractures involving 2 incisions (2.39 ± 2.91 vs 2.55 ± 2.97; $P = 0.7774$). No difference in the mean PACU pain scores was observed when comparing peripheral nerve blocks administered greater than and less than one hour from the procedure (2.48 ± 2.93 vs 2.39 ± 2.91; $P = 0.8715$). And finally, no difference in the mean PACU pain scores was observed when comparing peripheral nerve blocks performed with and without dexamethasone (2.39 ± 2.91 vs 2.48 ± 2.96; $P = 08824$).

4. Discussion

The objective of this retrospective comparative study was to assess patients undergoing isolated ankle ORIF with and without the use of peripheral nerve blocks for perioperative pain management. Our results demonstrate that subjects who received a peripheral nerve block did not have a significant difference in the mean PACU pain scores compared with patients who did not receive a peripheral nerve block, but the results did demonstrate that subjects who had a peripheral nerve block were less likely to receive a narcotic in the PACU and more likely to not receive any pain medication overall.

Many studies have shown the effectiveness of peripheral nerve blocks for perioperative pain management for patients undergoing foot and ankle elective procedures; however, no study has previously discussed multimodal pain management with peripheral nerve blocks for isolated ankle fracture patients having ORIF. Michelson et al. investigated multimodal analgesia therapy for patients undergoing ankle and hindfoot fusions with associated length of hospital stays. What they discovered is that multimodal therapy lowered the hospital length of stay by 2 days compared to traditional pain management, irrespective of the complexity of the surgery. However, this publication did not discuss the efficacy associated with isolated ankle fractures because the pathophysiology differs tremendously compared to elective hindfoot fusions.[19]

When we evaluated the patients' basic demographics, there were no statistical significant differences between the group of patients who received a peripheral nerve block and the group of patients who did not receive a peripheral nerve block. The type of fracture pattern, the type of medication used for the peripheral nerve block, and the comparing peripheral nerve blocks administered greater than and less than one hour from the procedure did not statistically change with the patient's mean PACU score between the 2 cohorts. Interestingly, Kahn et al. assessed the incidence of complications with the use of both popliteal and ankle blocks for foot and ankle surgery to aid in pain management. The authors concluded that the incidence of neurologic complications was 7.2% and serious complications 0.7% without clear etiology (surgical vs nerve block-related complications).[16] They also found a higher complication rate for popliteal blocks using perineural dexamethasone, although there was a lack of randomization to the study. Our study did not evaluate the long-term effects of the medication, but rather evaluated the medication's efficacy with postoperative pain management, and our findings did not show a significant difference among patient's postoperative pain score.

Interestingly, the average time spent in the PACU was approximately one hour longer in patients who received a peripheral nerve block compared with those patients who did

Table 2

Subject characteristics.

Subject characteristics	Subjects with peripheral nerve blocks (N = 54)	Subjects without peripheral nerve blocks (N = 17)	P
Age (y)	38.3 ± 13.62 (18–62)	44.76 ± 11.04 (20–59)	0.0795
Female gender (%)	30 (55.5)	10 (58.8)	1.00
BMI (kg/m^2)	30.37 ± 6.75 (20.3–47)	32.44 ± 8.98 (20.98–52.52)	0.3140
Smoking history (%)	33 (61.1)	11 (64.7)	1.00
Alcohol history (%)	3 (5.6)	2 (11.8)	1.00
Substance abuse history (%)	16 (29.6)	7 (41.2)	0.3885
Lauge-Hansen classification subtype (%)			
SER II	4 (7)	1 (6)	1.00
SER IV	36 (67)	11 (65)	1.00
PER III	3 (6)	1 (6)	1.00
PER IV	10 (19)	4 (24)	0.730
SAD II	1 (2)	0 (0)	1.00

Continuous data are presented as mean ± SD (range) and compared with an unpaired Students *t* test.
Categorical data are presented in terms of a frequency count (%) and compared with the Fisher exact test.
*Statistical significance defined as $P < 0.05$.
BMI, body mass index; SER, supination external rotation; PER, pronation external rotation, SAD, supination adduction.

Table 3
Primary outcomes.

Outcomes	Subjects with peripheral nerve blocks (N = 54)	Subjects without peripheral nerve blocks (N = 17)	P
Mean PACU pain scale	2.39 ± 2.91 (0–9.1)	3.52 ± 3.09 (0–9.25)	0.1724
Subjects experiencing mild pain (0–3 on VAS) [%]	63	47.1	0.2704
Average time in PACU prior to discharge (h)	2.06 ± 1.05 h (0–4.0 h)	1.21 h (0–3.5 h)	0.0004*

Statistical analysis was performed with the Fisher exact test for categorical variables and the unpaired Student t test for continuous variables.
Data presented as mean ± SD, %, or n/n (%).
* Statistically significant at $P < 0.05$.
PACU, postoperative care unit; VAS, visual analog scale.

Table 5
Secondary outcomes with comparisons to the mean PACU pain score.

		P
Isolated lateral malleolar fractures (2.39 ± 2.91)	Fractures involving multiple fractures (2.55 ± 2.97)	0.7774
Peripheral blocks performed within 1 hour of procedure (2.48 ± 2.93)	Peripheral blocks performed >1 hour from the procedure (2.39 ± 2.91)	0.8715
Peripheral blocks performed with dexamethasone (2.39 ± 2.91)	Peripheral blocks performed without dexamethasone (2.48 ± 2.96)	0.8824

Statistical analysis was performed with the Fisher exact test for categorical variables and the unpaired Student t test for continuous variables.
Data presented as mean ± SD, %, or n/n (%).
PACU, postoperative care unit.

not receive a peripheral nerve block, regardless of when patients received the block (preoperatively vs postoperatively). We can possibly contribute this to patients having nerve block site pain or peripheral nerve block medications wearing off earlier than expected; however, these outcomes were not measured in this study. Another reason for this significant difference could have been delayed PACU discharge not necessarily due to pain, but rather, due to concerns of motor weakness associated with the block and need for closer monitoring before safe discharge. Future studies may use these preliminary data to further assess patient's specific pain and mobility before discharge.

Although our primary results did not demonstrate statistically significant data, the results of postoperative pain medication distribution raise an interesting point of discussion. Subjects with a peripheral nerve block were less associated with receiving a narcotic in the PACU and more associated with not receiving any type of pain medication in the PACU, which was statistically significant compared with subjects without a peripheral nerve block. Fourteen of the 17 patients who did not have a peripheral nerve block were given either intravenous or oral narcotic for pain management in the PACU. Although we did not track postoperative pain medications given and taken after the patient was discharged from the hospital, this supports the idea that those subjects who received a peripheral nerve block were more likely to take less narcotic medications at home and overall decrease the narcotic use in the postoperative setting. Although this concept is theoretical in this study, results of this study may propagate further investigation, similarly to previous publications.[20]

Our study did have some inherent weaknesses and limitations. One of the major limitations of the study was the number of patients excluded (N = 100). Our results may have been skewed by excluding

patients sustaining polytrauma and patients who underwent surgery greater than one month after their initial injury. One of the other major limitations of the study was the inconsistency of recording the mean PACU pain scores. Many of the electronic medical charts did not record patient's pain immediately after surgery and immediately before their discharge, leading to a lower overall pain scale between the 2 cohorts, which could have skewed the overall results. This variation in documentation may have occasionally resulted in inconsistent reporting of each patient's pain scores. Such inconsistencies could be resolved by the development of a postoperative pain management protocol for patients recovering from orthopedic surgery in the PACU. A similar retrospective study could be completed after initiation of such a protocol. In addition, our study did not discuss the administration of preemptive oral analgesics administered preoperatively, as well as prescriptions of postoperative pain medications prescribed to the patient on discharge. The incorporation of such multimodal perioperative pain management into this study may have provided further insight into postoperative pain control in isolated ankle injuries, making this an inherent weakness of this study.

In conclusion, the results of our study showed no significant difference among patients who had a peripheral nerve block compared with those who did not for isolated ankle fracture ORIF. Although this study was limited by sample size, and our primary findings were not statistically significant, the study did reveal multiple compelling findings worthy of future investigation. This study provides better insight to multimodal pain management and may be used to better establish postoperative pain protocols, specifically in the immediate PACU phrase with patients undergoing isolated ankle fracture ORIF.

Disclosures

The authors have no conflicts of interest to declare.

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Table 4
Postoperative narcotic administration.

	Subjects with peripheral nerve blocks (n = 54)	Subjects without peripheral nerve blocks (n = 17)	Statistical comparison
Given a narcotic in the PACU	29 (53.7%)	14 (82.4%)	$P = 0.047$*†
Given a nonnarcotic pain medication in the PACU	4 (7.4%)	1 (5.9%)	$P = 1.00$
Given no pain medication in the PACU	21 (38.9%)	2 (11.8%)	$P = 0.042$*†

* Results reported in terms of a frequency count (%) and compared with the Fisher exact test.
†Statistical significance defined as $P < 0.05$.
PACU, postoperative care unit.

References

[1] Bendtsten TF, Lopez AM, Clark TB. Ultrasound-guided saphenous (adductor canal) block. New York School of Regional Anesthesia (NYSORA), 2020. Available at: https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/lower-extremity-regional-anesthesia-for-specific-surgical-procedures/foot-and-anckle/ultrasound-guided-saphenous-subsartorius-adductor-canal-nerve-block/. Accessed March 8, 2020.

[2] Bjørn S, Wan YW, Jørgen B, Kristian KN, Jens, B, Rasmus WH, Bendtsen TF. The importance of the saphenous nerve block for analgesia following major ankle surgery. Reg Anesth Pain Med 2018;43:474–479.

[3] Brummett CM, Waljee JF, Goesling J, Moser S, Lin P, Englesbe MJ, Nallamothu BK. New persistent opioid use after minor and major surgical procedures in US adults. JAMA Surg 2017;152:e170504.

[4] Carter TH, Oliver WM, Graham C, Duckworth AD, White TO. Medial malleolus: operative or Non-operative (MOON) trial protocol-a prospective randomized controlled trial of operative versus non-operative management of associated medial malleolus fractures in unstable fractures of the ankle. Trials 2019;20:1–9.

[5] Case log guidelines for foot and ankle orthopaedic surgery. 2020. Available at: https://www.acgme.org/Portals/0/PFAssets/ProgramResources/262_CaseLogGuidelines_FootandAnkleOS.pdf?ver=2015-11-23-151534-147. Accessed March 8, 2020.

[6] Chen EY, Betancourt L, Li L, Trucks E, Marcantonio A, Tornetta P III. Standardized, patient-specific, postoperative opioid prescribing after inpatient orthopaedic surgery. J Am Acad Orthopaedic Surgeons 2020; 28:e304–18.

[7] Christensen KP, Moller AM, Nielsen JK, Klausen TW, Sort R. The effects of anesthetic technique on postoperative opioid consumption in ankle fracture surgery. Clin J Pain 2016;32:870–4.

[8] Guy GP Jr, Zhang K, Bohm MK, Losby J, Lewis B, Young R, Murphy LB, Dowell D. Vital signs: changes in opioid prescribing in the United States, 2006–2015. Morb Mortal Wkly Rep 2017;66:697–704.

[9] Helmerhorst GT, Lindenhovius AL, Vrahas M, Ring D, Kloen P. Satisfaction with pain relief after operative treatment of an ankle fracture. Injury 2012;43:1958–61.

[10] Inciardi JA, Surratt HL, Lugo Y, Cicero TJ. The diversion of prescription opioid analgesics. L Enforc Exec Forum 2007;7:127–41.

[11] Jones CM, Christensen A, Gladden RM. Increases in prescription opioid injection abuse among treatment admissions in the United States, 2004–2013. Drug Alcohol Depend 2017;176:89–95.

[12] Kahn RL, Ellis SJ, Cheng J, Curren J, Fields KG, Roberts MM, Yadeau JT. The incidence of complications is low following foot and ankle surgery for which peripheral nerve blocks are used for postoperative pain management. HSS J 2018;14:134–42.

[13] Kang C, Lee GS, Kim SB, Won YG, Lee JK, Jung YS, Cho HJ. Comparison of postoperative pain control methods after bony surgery in the foot and ankle. Foot Ankle Surg 2018;24:521–4.

[14] Koehler RM, Ugochi CO, Lisa KC. A systematic review of opioid use after extremity trauma in orthopedic surgery. Injury 2018;39:1003–007.

[15] Kortekangas T, Haapasalo H, Flinkkilä T, Ohtonen P, Nortunen S, Laine HJ, Pakarinen H. Three week versus six week immobilization for stable Weber B type ankle fractures: randomized, multicentre, non-inferiority clinical trial. BMJ 2019;364:k5432.

[16] Levin P. The opioid epidemic: impact on ortho-paedic surgery. J Am Acad Orthop Surg 2015;23:e36–7.

[17] Manchikanti L, Singh A. Therapeutic opioids: a ten-year perspective on the complexities and complications of the escalating use, abuse, and nonmedical use of opioids. Pain Phys 2008;11(suppl 2):S63–88.

[18] Merrill H, Steven, N, Buchanan M, Cuttica D, Daniel D, Mottla J. Opioid consumption following foot and ankle surgery. Foot Ankle Int 2018;39: 649–56.

[19] Michelson JD, Raymond AA, Mark DC. Multimodal analgesia therapy reduces length of hospitalization in patients undergoing fusions of the ankle and hindfoot. Foot Ankle Int 2013;34:1526–34.

[20] Paulozzi LJ, Jones CM, Mack KA, Rudd RA; Centers for Disease Control and Prevention (CDC). Vital signs: overdoses of prescription opioid pain relievers: United States, 1999-2008. MMWR Morb Mortal Wkly Rep 2011;60:1487–92.

[21] Provenzano DA, Viscusi ER, Adams SB Jr, Kerner MB, Torjman MC, Abidi NA. Safety and efficacy of the popliteal fossa nerve block when utilized for foot and ankle surgery. Foot Ankle Int 2002;23:394–9.

[22] Soffin EM, Waldman SA, Stack RJ, Liguori GA. An evidence-based approach to the prescription opioid epidemic in orthopedic surgery. Anesth Analgesia 2017;125:1704–13.

[23] Rudd RA, Set P, Scholl L. Increases in drug and opioid-involved overdose deaths—United States, 2010–2015. MMWR Morb Mortal Wkly Rep 2016;65:1445–52.

[24] Saini S, McDonald EL, Shakked R, Nicholson, K, Rogero R, Chapter M, Daniel JN. Prospective evaluation of utilization patterns and prescribing guidelines of opioid consumption following orthopedic foot and ankle surgery. Foot Ankle Int 2018;39:1257–65.

[25] Schipper ON, Hunt KJ, Anderson RB, Davis WH, Jones CP, Cohen BE. Ankle block vs single-shot popliteal fossa block as primary anesthesia for forefoot operative procedures: prospective, randomized comparison. Foot Ankle Int 2017;38:1188–91.

[26] Scholl L, Wilson N, Karissa M, Seth P, Baldwin G. Drug and opioid-involved overdose deaths—United States, 2017–2018. MMWR Morb Mortal Wkly Rep 2020;69:290–7.

[27] Sinatra RS, Torres J, Bustos AM. Pain management after major orthopaedic surgery: current strategies and new concepts. JAAOS-Journal of the American Academy of Orthopaedic Surgeons, 10(2), 117-129. Murthy VH: ending the opioid epidemic—a call to action. N Engl J Med 2016;375:2413–15.

[28] Vloka JD, Hadzic A. Popliteal sciatic nerve block—landmarks and nerve stimuli technique. Available at: https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/lower-extremity-regional-anesthesia-for-specific-surgical-procedures/foot-and-anckle/block-sciatic-nerve-popliteal-fossa/. Accessed March 8, 2020.

[29] Volkow ND, McLellan TA, Cotto JH, Karithanom M, Weiss SR. Characteristics of opioid prescriptions in 2009. JAMA 2011;305: 1299–301.

[30] Yde J. The Lauge Hansen classification of malleolar fractures. Acta Orthopaedica Scand 1980;51:181–92.